

V. *An Account of the Fall of a Meteoric Stone in the Cold Bokkeveld, Cape of Good Hope.* By THOMAS MACLEAR, Esq. F.R.S. &c., in a Letter to Sir JOHN F. W. HERSCHEL, Bart. V.P.R.S. &c. &c. Communicated by Sir J. F. W. HERSCHEL.

Received March 7,—Read March 21, 1839.

Royal Observatory, Cape of Good Hope,
November 24, 1838.

DEAR SIR JOHN,

A METEOR exploded on the 13th of October in the Cold Bokkeveld, with a noise so loud as to be heard over an area of more than seventy miles in diameter, in broad daylight, about half-past nine in the morning. It was seen traversing the atmosphere north-east of the point where it exploded sixty miles, of a silvery hue, the air at the time calm, hot, and sultry. The barometer chanced to be observed at Worcester, where the air was also calm and hot. It stood at the lowest point of its range, but, from the construction of the instrument, that point cannot be noted in inches unless by comparison with another, which I will endeavour to have done the first opportunity.

The explosion was accompanied by a noise like that from artillery, followed by the fall of pieces of matter, of which I send you the largest and best specimen I have seen, procured by Mr. Watermeyer. Portions fell or were dispersed on the ground at the distance of an hour, or five miles from each other. Some falling on hard ground were smashed; others on moist ground plunged into the earth; and I am told that one piece made a hole as broad as three feet, and sunk deep. It is stated to have been so soft as to admit of being cut with a knife where it first fell; then it hardened, but I cannot learn anything as to its temperature at that moment. If the reports are correct, I estimate the original solid mass at five cubic feet, viz. the sum of all the portions that fell to the ground.

That which I send to you is a good specimen, for the fracture is exactly similar to those I have seen that fell elsewhere, but, from being broken into small pieces, few of them have any crust or outside to show the state of fusion. This exhibits that state all over: when the two pieces are applied to each other they exactly fit, and show that it was in a state of ignition when it separated from the rest in the air.

Mr. Judge MENZIES told me he was returning from circuit accompanied by Mr. GEORGE THOMPSON. On the morning of the 13th "he was in the bush," about sixty miles from the Bokkeveld, on his way homewards. The air was hot and calm, as preceding a thunder storm, but the clouds were not dark; on the contrary, they had

an unusual reddish tint. About half-past nine his attention was roused by something like a meteor, of a silvery colour, passing through the atmosphere, to which he directed the attention of those about him. The object moved in the direction of the Bokkeveld. He proceeded on his journey, and arrived in the evening at the place of Mr. DE TOIT, where he was told that a meteor had exploded in the morning, with a report as loud as "from three pieces of cannon," and that some of it fell close to the place, one nearly striking a person in a field.

Mr. TRUTER, Civil Commissioner of Worcester, was sitting in his office. He told me that the windows suddenly shook; immediately a rumbling noise followed, which he supposed was the precursor of an earthquake; his barometer stood at the lowest point of its range. Mrs. TRUTER heard a similar noise in the dwelling-house; other persons in the town were startled by the like noise; the next day he heard of the meteor in the Bokkeveld. The statement made to him by several persons is so like the statement in the inclosed letter of Mr. WATERMEYER's correspondent, that it is unnecessary to repeat it.

Understanding that Mr. WATERMEYER had obtained a portion of the meteorolite of considerable dimensions, I wrote to him to request a piece for you. He returned the inclosed reply, together with the whole specimen, wherein you will find that he had designed it for you. The clergyman's communication is clear and comprehensive.

On reference to the Observatory Meteorological Journal, there is nothing remarkable noted.

	h	Barom.	Out. Ther.	Wet.	Wind.	
Oct. 12.	9 $\frac{1}{2}$	30·191	60·1	58·5	4 S.	8 blue.
	20 $\frac{2}{3}$	·247	68·2	62·5	38 $\frac{1}{2}$	6 b. cirri. Direction horiz.
13.	Noon	·242	74·2	67	3 SSW.	5 blue cirri.
	3 $\frac{1}{3}$	·230	74·2	68·7	4 SSW.	6 blue cirri.

Therefore the effect did not extend so far.

You will find the Cold Bokkeveld on the map by carrying your finger along the parallel of St. Helena Bay.

Believe me, dear SIR JOHN,

Your faithful Servant,

THOMAS MACLEAR.

*Translated Extract from a Letter of the Rev. Mr. FAHN to Mr. WATERMEYER, dated
Tulhagh, 6 Novem. 1838.*

The object of these lines is to fulfil my promise in sending to you herewith one of the stones which fell simultaneously during the atmospheric tremor in the Cold Bokkeveld, on the 13th of October. This stone was found between the estates of JACOBUS JOOSTEN and PIETER DE TOIT. Several have fallen on the place of RUDOLPH VAN HEERDEN, where one fell on the hard road, and was dashed to pieces. Another on a ploughed field sunk a few inches into the ground, and a third falling on a moist place near water, lodged itself to the depth of several feet. Some people say they observed smoke whilst these stones fell; and also that when they were picked up a smell was observable, as between sulphur and gunpowder.

The stone which you receive lay one hour distance from the place where the others were found. In the *same* direction in which the agitation was perceptible, viz. from N.W. to S.E. more stones were found. Some people saw in the same direction also a dark blue streak, which lost itself in a south-easterly direction. I have another somewhat larger stone in the Bokkeveld, which was too heavy for me to carry on horseback. If the latter one can be of service to you, I shall not fail to send it. This stone was found in *two* pieces, as it is at present.

Mr. WATERMEYER's Letter to THOMAS MACLEAR, Esq.

Wednesday Morning,
21 Novem. 1838.

MY DEAR SIR,

I have to thank you for the favour of your note of Saturday last by Doctor KRAUSS.

As soon as I received the accompanying specimen, it was destined by me for our much-esteemed friend Sir JOHN HERSCHEL. You will therefore perhaps have the kindness to transmit it to Sir JOHN, with my sincerest regards, by some fit opportunity. I have added (in the preceding extract) whatever little information Mr. FAHN's letter contains on the subject. I shall write to Mr. FAHN by this week's post, to send me the second specimen also, of which he speaks. If there be no *immediate* opportunity of forwarding it to England, it might perhaps be proper to exhibit it first at our next Institution meeting, as I have not yet had an opportunity of showing the stone to any of its members.

Believe me, my dear Sir,

Sincerely and respectfully yours,

J. WATERMEYER.

Chemical Account of the Cold Bokkeveld Meteoric Stone. By MICHAEL FARADAY, Esq. D.C.L. F.R.S. &c., in a Letter to Sir J. F. W. HERSCHEL, Bart. V.P.R.S. &c. &c. Communicated by Sir J. F. W. HERSCHEL, Bart.

Received March 7,—Read March 21, 1839.

Royal Institution,
February 28, 1839.

MY DEAR SIR JOHN,

I am at last able to send you a chemical account of the meteoric stone, leaving its physical characters (except some of those which bear upon the chemical results) entirely for your observation.

The stone is soft, porous, and hygrometric. A piece of it which, at common temperature, weighed 194·4 grains, by being perfectly saturated with water under the air-pump receiver, became 202 grains, and when thoroughly dried became 182·9 grains. In its most moist condition it had a specific gravity of 2·48, which, if abstraction be made of the water in it, would give a specific gravity of 2·94 for the dry stony matter.

It has a very small degree of magnetic power, and that is irregularly dispersed in the stone.

The heat of the mouth blowpipe sends off sulphur, and softens, but does not fuse it; a higher heat, after softening it still more, makes it run into a very fluid state, the globule when cold being black and opaque.

The composition of the stone may be gathered from the following analytical results, calculated for 100 parts of the stone in its natural state:

Water	6·50
Sulphur	4·24
Silica	28·90
Protoxide of iron	33·22
Magnesia	19·20
Alumina	5·22
Lime	1·64
Oxide of nickel	0·82
Oxide of chromium	0·70
Cobalt, a trace	
Soda, a trace	
	<hr/>
	100·44

I have entered the *iron* above as protoxide, and nearly the whole of it is in that state. But there are portions, though very small, of metallic iron present. I could

not collect more than 0·06 from 100 parts of the stone. Of this the largest portion was in very fine particles, recognisable only by their magnetic properties, and the evolution of hydrogen by dilute sulphuric acid; but there was one piece of sufficient size to show the malleability, lustre, and other general properties of the metal. This metallic iron contained nickel as well as the stone generally. A part of the iron in the stone was also in the state of sulphuret, as was evident by the sulphuretted hydrogen evolved on the action of acids.

The result with regard to the *sulphur* was obtained in the form of sulphate of baryta; but though I have entered it as sulphur only in the analysis, it did not all have that state in the stone, for a part of it was there as sulphuric acid. In fact, water only, when boiled with the stone, removed small portions both of sulphate of lime and sulphate of soda; and this was the case when, on repeating the experiments, I was very careful to take parts from *the middle* of the smaller fragment, parts which had not seen the light until I broke them out. It is a question, however, whether the soda belonged to the stone when it fell, and what proportion of sulphuric acid was in it at that time; for the stone being porous and hygrometric, the water and air in it may have converted a part of the sulphur into sulphuric acid; and as to the soda, I think it must have been acquired upon the earth; for the water separated also a portion of destructible organic substance, and the larger fragment of the stone still has small particles of insoluble vegetable matter adhering to it, having the appearance of being derived from manure.

I am, my dear Sir JOHN,

Yours most faithfully,

M. FARADAY.

Sir JOHN F. W. HERSCHEL, *Bart.*

&c. &c. &c.